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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/983,066	10/23/2001	Joo-Hyong Lee	1607-0257P	8895

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EXAMINER

PIZARRO CRESPO, MARCOS D

ART UNIT PAPER NUMBER

2814

DATE MAILED: 10/01/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/983,066

Applicant(s)

LEE ET AL.

Examiner

Marcos D. Pizarro-Crespo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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Attorney's Docket Number: 2332-0134P

Filing Date: 10/23/2001

Claimed Priority Dates: 1/21/2000 (Continuation 09/488,549)
1/22/1999 (KR 99-1909)

Applicant(s): Lee et al.

Examiner: Marcos D. Pizarro-Crespo

DETAILED ACTION

This Office action responds to the amendment in paper no. 9 filed on 7/10/2003.

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37CFR1.114, including the fee set forth in 37CFR1.17(e), was filed in this application after the final rejection in paper no. 8, mailed on 3/10/2003. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/11/2003 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

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were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1 and 3-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stolmeijer (US 5384279) in view of Gardner (US 5899732).

5. Stolmeijer shows (see, e.g., fig. 3) most aspects of the instant invention including a semiconductor device comprising:

- a semiconductor substrate **1** having a conductivity type
- twin wells **5**, **6** formed in adjacent regions of a surface portion of the semiconductor substrate **1**
- a first **5** of the twin wells having a second-conductivity type (*i.e.*, n-type) formed in a first portion of the substrate **1** such that, in a direction of depth, a junction exists between the first twin well **5** and the substrate **1**
- a second **6** of the twin wells having the first-conductivity type (*i.e.*, p-type) formed in a second portion of the substrate **1**, such that, in a direction of depth, a junction exists between the second twin well **6** and the substrate **1**

wherein the substrate **1** has no buried implanted layer beneath the twin wells **5**, **6**.

In addition, Stolmeijer (see, e.g., col.5/ll.22-25) shows that the semiconductor substrate **1** comprises a highly doped region **2** and a lesser-doped epi-layer **3**. Stolmeijer, however, fails to specify the conductivity type of the substrate **1**.

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Gardner (see, e.g., col.4/ll.4-5), on the other hand, teaches that it is typical for Stolmeijer's substrate to either has a first-conductivity-type, *i.e.*, p-type, or a second-conductivity-type, *i.e.*, n-type. Gardner (see, e.g., col.4/ll.5-7) teaches further that a first-conductivity-type is even more typically used due to a lesser sensitivity to process-induced defects.

Consequently, it would have been obvious to one of ordinary skill in the art to have Stolmeijer's substrate of a first-conductivity-type, as suggested by Gardner, to obtain a substrate that is less sensitive to process-induced defects.

6. Regarding claim 3, Stolmeijer shows (see, e.g., fig. 3) three layers **12, 13, 15** of ions included in the second twin-well **6**.

7. Regarding claim 4, Stolmeijer shows (see, e.g., fig. 3) three layers of ions included in the second twin-well **6**, the three layers including lower **12** and middle **13** layers of a retrograde well and a threshold-voltage layer **15** in the surface of the retrograde well.

8. Regarding claim 5, Stolmeijer shows (see, e.g., fig. 3) two layers of ions included in the first twin-well **5**, the two layers including a lower layer **10** of a retrograde well and a threshold-voltage layer **14** at the surface of the retrograde well.

9. Regarding claim 6, Stolmeijer shows that the twin wells are symmetric about an axis perpendicular to the surface of the substrate (see, e.g., fig. 3).

10. Regarding claim 7, Stolmeijer shows that the twin wells have equal depth (see, e.g., fig. 3)

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11. Regarding claim 8, Stolmeijer shows the first twin-well **5** extending to a predetermined depth in the substrate **1**, and increasing in second-conductivity-type impurity-ion concentration in the direction of depth (see, *e.g.*, col.6/ll.5-10,45-68; col.7/ll.1-31).

12. Regarding claim 9, Stolmeijer shows the second twin-well **6** extending to a predetermined depth in the substrate **1**, and increasing in first-conductivity-type impurity-ion concentration in the direction of depth (see, *e.g.*, col.6/ll.5-10,45-68; col.7/ll.1-31).

13. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stolmeijer in view of Gardner as applied to claim 1 above, and further in view of Takamura (US 5795803).

14. Stolmeijer/Gardner shows most aspects of the instant invention (see paragraphs 5-12 above), but fails to show the well regions having a junction depth of 1.5 μm . Nevertheless, depth differences are considered obvious design choices subject to routine experimentation and optimization and are not patentable unless unobvious or unexpected results are obtained.

Takamura (see, *e.g.*, col.4/ll.49-52), for example, teaches that junction depths should be deeper than the bottom of device isolation regions. Takamura (see, *e.g.*, col.4/ll.54-56) further teaches that the location of the junction can be adjusted by regulating the implantation energy of the impurity ions.

Therefore, it would be an obvious matter of design choice to select a suitable junction depth for the twin wells of Stolmeijer/Gardner, as taught by Takamura, since

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the junction depth is a variable of importance subject to routine experimentation and optimization and it is not inventive to discover the workable ranges. *In re Aller*, 220 F.2d 454, 105 USPQ 233, 235.

Response to Arguments

15. Applicant's arguments with respect to claims 1-9 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

16. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. Papers should be faxed to Art Unit 2814 via the Art Unit 2814 Fax Center located in Crystal Plaza 4, room 3C23. The faxing of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(703) 308-7722** or **-7724**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications.

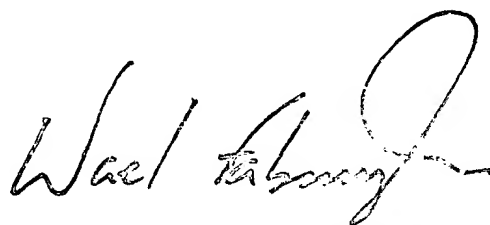
17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Marcos D. Pizarro-Crespo** at **(703) 308-6558** and between the hours of 9:00 AM to 7:30 PM (Eastern Standard Time) Monday through Thursday or by e-mail via Marcos.Pizarro@uspto.gov. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy, can be reached on (703) 308-4918.

18. Any inquiry of a general nature or relating to the status of this application should be directed to the **Group 2800 Receptionist** at **(703) 308-0956**.

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19. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass(es): 257/371; 438/223,224	9/23/2003
Other Documentation: PLUS Analysis	10/1/2002
Electronic Database(s): EAST (USPAT, EPO, JPO)	9/23/2003



SUPERVISORY PRIMARY EXAMINER
TECHNOLOGY CENTER 2800

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